August 15, 2005

Cost-Benefit Analysis: Proposed Regulations Implementing the Final General Management Plan Amendment/ Environmental Impact Statement for Dry Tortugas National Park

This cost-benefit analysis provides an economic justification for the proposed regulations implementing the Final General Management Plan Amendment/Environmental Impact Statement (*FGMPA/EIS*) (National Park Service January 2001) for Dry Tortugas National Park. The justification is provided in a statement of need and a qualitative analysis of the likely costs and benefits resulting from five alternatives considered, including the proposed action. A quantitative analysis of costs and benefits was not conducted due to a lack of available data, and because the additional cost of conducting a quantitative analysis was not considered to be reasonably related to the expected increase in the quantity and/or quality of relevant information. The National Park Service (*NPS*) believes that this analysis provides a sufficient assessment of all relevant costs and benefits associated with this proposed action. Nevertheless, NPS solicits public comment and data that are relevant to the assessment of these costs and benefits.

The results of this analysis indicate that the costs of the proposed action are likely justified by the associated benefits. Additionally, this proposed regulatory action will not have an annual economic effect of $100 million in cost, and will not adversely affect an economic sector, productivity, jobs, the environment, or other units of government. This proposed regulatory action is expected to improve economic efficiency.

1. Statement of Need for the Proposed Action

The purpose of this proposed action is to implement the FGMPA/EIS, which establishes the management framework for decision making in the park for the next 15 to 20 years. The park has been operating under the General Management Plan/Development Concept Plan/Environmental Assessment that was prepared in 1983. Although much of the 1983 plan is still applicable, NPS planning guidance has changed and the older plan does not address current issues. The older plan needs amending to provide overall guidance for the future use of resources and facilities; to clarify research and resource management needs, priorities, and strategies; and to address changing levels of park visitation and use. The FGMPA/EIS would replace the 1983 plan under the proposed action.

The specific issues addressed in the FGMPA/EIS include protection of near-pristine resources such as coral reefs and sea grass beds, the protection of submerged cultural resources, the management direction of commercial services to provide transportation and assistance in educating visitors, and the determination of appropriate levels and types of visitor use. Establishing appropriate levels of visitor use is especially

important given the large increase in visitation the park has experienced since the 1983 plan was implemented. From 1983 to 2000, visitation at the park increased from 11,004 to 83,704 recreational visitors annually (National Park Service 2005). This increase, primarily due to the advent of high-speed ferries, created serious concerns about potential threats to park resources, facilities, and visitor experiences.[1] The resources and infrastructure at the park cannot sustain such growth rates and still provide visitors a high-quality experience. Additionally, adverse impacts from commercial and recreational fishing have been documented. Research conducted from the 1990s through 2001 found that coral reef fish stocks in the Tortugas area have been significantly depleted, threatening the integrity and natural dynamics of the ecosystem. For example, the average size of black grouper is now 40 percent of what it was around 1930, and the spawning stock is now less than 10 percent of its historical un-fished maximum (Ault et al. 2002).

Regulatory action is needed to more effectively address market failures related to these specific issues. The type of market failure to be addressed is "externality." An externality occurs when one party's actions impose uncompensated benefits or costs on another. Specifically, the increasing levels of use described above impose uncompensated impacts on resource protection and visitor use and enjoyment. The proposed regulatory action will enhance resource protection and visitor use and enjoyment by establishing management zones and visitor carrying capacities to more effectively manage resource use within the park. These enhancements will improve economic efficiency by reducing uncompensated impacts.

2. Alternatives Considered

The FGMPA/EIS describes in detail the five alternatives considered, including the proposed action. This section summarizes those alternatives. Alternative C describes the proposed action (National Park Service July 2001), and is summarized first. The other alternatives considered are then summarized in comparison to the proposed action. Alternative A is the baseline for this analysis, which describes the conditions that would exist absent regulatory action.

2.1 Alternative C - The Proposed Action

The goal of the proposed action is to afford a high level of protection to park resources and to provide for appropriate types and levels of high-quality visitor experiences. This would be achieved through the use of management zones, a visitor carrying capacity, and commercial services to direct and structure visitor use.

[1] In May 1999, the park established a moratorium on new or expanded commercial services to stabilize visitation until the Final General Management Plan Amendment could be implemented.

The management zones are designed to guide the management of specific areas for desired resource conditions and visitor experiences. The following zones would be established under this alternative. See the FGMPA/EIS for specific locations.

- Natural/Cultural Zone: This zone would include 50 percent of the park. Natural conditions would remain largely intact, natural processes would predominate, and little lasting evidence of recreational impacts would be discernable. Maintenance or improvement of resource quality would be emphasized, but visitors would be free to move about the zone with few restrictions. Appropriate activities would include snorkeling, scuba diving, swimming, boating, wildlife viewing, and recreational fishing. The use of anchors would be generally permitted. However, tying to mooring buoys may be required in certain areas if protection of sensitive resources warrants additional management action to reduce or mitigate impacts, such as limiting anchoring. Opportunities for adventure and challenge would be relatively high compared to other zones.

- Research Natural Area Zone: This zone would include 46 percent of the park. It would include a representative range of the park's near-pristine terrestrial and marine ecosystems. Management emphasis would be to provide the greatest possible protection of resource integrity and to promote non-manipulative research and visitor education. Natural processes would occur without disturbance or impacts from humans. A variety of recreational and educational opportunities would be available to visitors in this zone, including wildlife viewing, snorkeling, and diving. Recreational fishing and other resource consumptive activities would not be allowed in this zone. Boaters would be required to use mooring buoys, and anchoring would be prohibited.

- Historic Preservation/Adaptive Use Zone: This zone would include 3 percent of the park, and would be applied to Garden Key (Fort Jefferson), and would extend outward for a distance of 1 nautical mile to encompass surrounding waters, including those around Bush and Long Keys. The central area of Loggerhead Key, where the historic lighthouse and adjacent buildings are located, would also be designated for historic preservation/adaptive use. Visitors would experience an environment of architectural and cultural history. Appropriate visitor activities would include studying history, bird watching, swimming, snorkeling, scuba diving, camping, boating, overnight anchoring, and recreational fishing.

- Special Protection Zones: These zones would include less than 1 percent of the park. They would provide added protection for critical resources and would be managed to allow natural processes to occur without disturbance from humans. Only limited research activities would be allowed. These zones are a management tool that would allow for the protection of resources at certain times and in certain places throughout the park. Hospital and Long Keys, and a rare elkhorn coral community near Long Key, would be designated special protection zones year-round. Bush and East Keys would be designated special protection zones during critical turtle and bird nesting and hatching season.

The visitor carrying capacity is designed to protect park resources and the quality of visitor experiences. The initial visitor carrying capacity for Garden Key would permit a maximum of approximately 330 people per day. This includes 24-36 people at Loggerhead Key during the day and 68 people per night at the campground. This visitor carrying capacity is described in Table 1.[2] NPS would determine whether this carrying capacity is achieving the desired levels of resource protection and visitor experience, and would make adjustments as necessary. Additionally, a reservation system would be established for the campground, and private boaters would be required to obtain a permit to enter park waters. Finally, a park entrance fee would be established to help support the additional costs of these management actions.

Table 1
Proposed Visitor Carrying Capacity for Alternatives B, C, D, and E

Garden Key	The maximum total carrying capacity would be approximately 330 visitors per day. This includes 24-36 people who might visit Loggerhead Key during the day. Permits for concession contract holders would be written to 1) ensure that arrivals and departures are staggered throughout the day, 2) reduce point-loading at any given site, especially the dock, and 3) reduce the total number of people at one time on the key. *Visitor arrival allotments:* 150 by ferry 60 by air taxi 50 by private boats or commercial use authorizations 68 at the campground at one time 328 total *Campground allotments:* 48 consisting of 8 individual sites with 6 campers each 20 consisting of 1 group site with 20 campers 68 total *Tour allotments:* Tours would be limited to 20-25 people, and staggered so that concurrent tours are not visible to each other except for brief periods of time. *Mooring buoys:* Mooring buoys would be located in each zone after analysis to determine their number and location. *Snorkeling and diving:* Group size in the Research Natural Area Zone would be limited to 12 passengers.

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[2] This visitor carrying capacity would also be applicable to Alternatives B, D, and E. However, the composition of permitted visitor activities would be consistent with the respective management zone allocation for each alternative.

Table 1 (*continued*)
Proposed Visitor Carrying Capacity for Alternatives B, C, D, and E

Loggerhead Key	The maximum total carrying capacity would be 24-36 visitors per day. This capacity would be included in the maximum total carrying capacity for Garden Key. The initial total carrying capacity would be set at 24 to 1) establish a monitoring program and collect baseline data, and 2) complete re-vegetation currently underway. Of the initial 24-visitor capacity, 12 would be for commercial use authorizations and 12 would be for private boats. More private boats might be allowed if the commercial use authorization allotment is not filled. In the Historic Preservation/Adaptive Use Zone, uses such as picnicking, hiking, and exploring would be unrestricted, consistent with determinations by the Superintendent that access is safe and appropriate for the purposes of the park. Access to all beach/tidal areas would be restricted to the area between the low water line and where the dune grasses begin. There would be no access to shallow (6 feet or less), near shore coral reefs. Swimming would not be allowed from Loggerhead Key beaches. Access to upland areas within the Research Natural Area Zone would be allowed only on a designated trail on the northeast end of the Key. This trail would go to cultural sites and to the beach.

Commercial services would be available to transport visitors to the park and to provide guide/interpretive/educational services.[3] A concession contract would be issued for one seaplane operator who would be authorized to carry 60 visitors per day. A second concession contract would be issued for one ferry operator who would be authorized to carry 150 visitors per day. The number of vessels used and the arrival and departure patterns would be determined in the concession contracting process. The role of the ferry operator would be expanded to provide transportation from Garden Key to other park locations and to provide guide/interpretive/educational services to supplement those provided by NPS. Other appropriate commercial services in the park, such as guided fishing, sailing, and diving trips, would be permitted by commercial use authorizations.[4] The total number of commercial use authorizations would not exceed 30 or the capacity of the resources to accommodate use.

[3] These commercial services would also be available under Alternatives B, D, and E. However, the composition of commercial services offered would be consistent with the respective management zone allocation for each alternative.
[4] Commercial use authorizations are currently called incidental business permits.

Additionally, specific plans would be developed to guide the management and protection of park resources. These plans include the following.

- Visitor Experience and Resource Protection Plan
- Resource Management Plan
- Research, Inventory, and Monitoring Plan
- Comprehensive Interpretive Plan

2.2 Alternative A - Baseline

The costs and benefits of a regulatory action are measured with respect to its baseline conditions. The baseline conditions describe the state of the world that would exist without the proposed action. Therefore, all costs and benefits that are included in this analysis are incremental to the baseline conditions. That is, any future impacts that would occur without the proposed action, as well as any past impacts that have already occurred, are not included in this analysis.

Alternative A describes the baseline conditions for this analysis. It would continue current park management policies and operations, including those described in the 1983 General Management Plan/Development Concept Plan/Environmental Assessment. Those policies do not include the establishment of a visitor carrying capacity or a Research Natural Area Zone. Commercial services would continue to be offered under commercial use authorizations.[5] Visitation may increase if commercial use authorization holders use larger vessels or if the number of private boaters increases. The park would attempt to accommodate increasing visitor use while protecting resources to the extent allowable under current policies.

2.3 Alternative B

Alternative B would provide greater protection to natural and cultural resources than Alternative A, and visitor use would be more carefully managed. The visitor carrying capacity described in Table 1 would apply; however, a Research Natural Area Zone would not be established. Where critical resource degradation was observed, NPS would implement intensive protection or remediation measures. Commercial services would be offered under commercial use authorizations, consistent with the uses permitted under the management zone allocation for this alternative (Table 2). The total number of commercial use authorizations would not exceed 55 or the capacity of the resources to accommodate use. Visitors would continue to travel freely and experience a variety of recreational opportunities throughout much of the park.

[5] In 1999, 55 commercial use authorization permits were issued to two ferry operators, four seaplane operators, and 40 smaller boats for sailing, fishing, scuba diving, snorkeling, and bird watching. The number of permit holders subsequently declined to 31 in 2001 through attrition and enforcement of the 1999 moratorium on new or expanded commercial services.

2.4 Alternative D

The provisions of Alternative D are similar to the proposed action (Alternative C) although the Research Natural Area Zone would be slightly smaller (41 percent of the park) and its configuration would be different. The visitor carrying capacity described in Table 1 would apply. Commercial services would be offered under two transportation concession contracts or under commercial use authorizations, consistent with the uses permitted under the management zone allocation for this alternative (Table 2). The total number of commercial use authorizations would not exceed 30 or the capacity of the resources to accommodate use. Visitors would be required to use commercial tours to visit and enjoy attractions in the Research Natural Area Zone. Private boaters would be allowed to transit through the Research Natural Area Zone without a permit, but would not be allowed to anchor or tie up to mooring buoys. For recreational activities inside the park but outside the Research Natural Area Zone, private boaters would be required to obtain a permit and pay an entrance fee.

2.5 Alternative E

Under Alternative E, the majority of the park would be designated a Research Natural Area Zone (96 percent), and primary emphasis would be placed on resource protection and conservation. The visitor carrying capacity described in Table 1 would apply. Commercial services would be offered only under two transportation concession contracts, consistent with the uses permitted under the management zone allocation for this alternative (Table 2). No commercial use authorizations would be issued under this alternative. Private boaters would moor at Garden Key and then join tour operations. Visitor use would be highly restricted throughout the park, and private boat use and recreational fishing would be restricted in most of the park.

2.6 Summary of Alternatives

All action alternatives (B, C, D, and E) incorporate the visitor carrying capacity described in Table 1. Each of these alternatives also provide for commercial visitor services, consistent with the uses permitted under their respective management zone allocations. Those allocations are described in Table 2. Therefore, the primary differences between Alternatives B, C, D, and E are associated with the allocations of management zones. Since the visitor carrying capacity would remain the same, NPS does not believe that the total quantity of commercial visitor services offered would necessarily change between the four action alternatives. Only the composition of those commercial services would be expected to change. For example, there could be less guided fishing trips but more guided diving/snorkeling trips offered under Alternative C than under Alternative D because Alternative C would have a larger Research Natural Area Zone than Alternative D.

Table 2
Comparison of Management Zone Allocations by Alternative

	Alternative				
Management Zone	**A[1]**	**B**	**C**	**D**	**E**
Natural Cultural	99%	96%	50%	55%	0%
Research Natural Area	0%	0%	46%	41%	96%
Historic Preservation/Adaptive Use	<1%	3%	3%	3%	3%
Special Protection	<1%	<1%	<1%	<1%	<1%

[1]Alternative A represents the 1983 GMP. Percentages shown for this alternative are the general equivalents of the management zones described in the FGMPA/EIS.

3.0 Costs

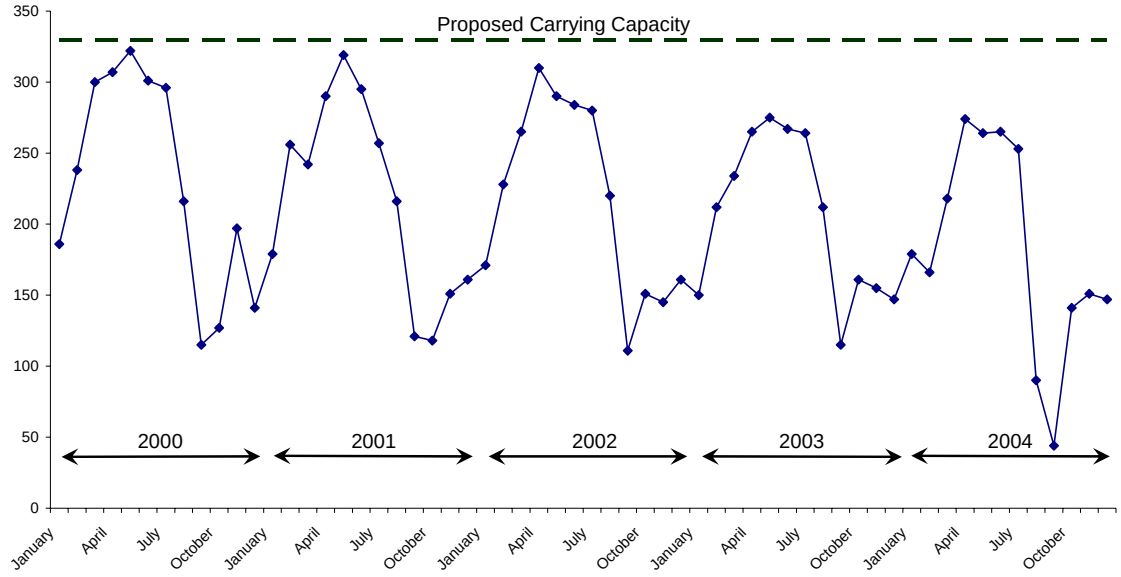
The incremental costs that are potentially associated with each of the action alternatives include impacts on visitors and impacts on the providers of commercial services. The measure of cost with respect to visitor impacts is the lost consumer surplus suffered by individuals who would not be able to visit the park under one of the action alternatives.[6] Leeworthy and Bowker (1997) estimate that $1.2 billion in consumer surplus is gained annually from natural resource recreation in the Florida Keys area. The average amount of consumer surplus is $654 per person per trip (in 1995/1996 dollars) (*ibid.*). Therefore, the costs associated with any restrictions on visitor use are potentially significant.

NPS public use statistics were examined to assess whether the proposed visitor carrying capacity would restrict visitation at the park. This carrying capacity (Table 1) would apply to all action alternatives. The average number of recreational visits per day from 2000 to 2004 is illustrated in Figure 1. Despite the large increase in visitation from 1983 to 2000, visitation at the park has remained relatively stable from 2000 to 2004. Indeed, Figure 1 suggests a slight downward trend.[7]

[6] Consumer surplus is the value an individual receives from a good or service over and above the costs incurred to use that good or service.

[7] This is potentially due to several factors including the 1999 moratorium on new or expanded commercial services, hurricanes, and the general state of the economy.

Figure 1
Average Number of Recreational Visits per Day in Dry Tortugas National Park



Source: National Park Service. http://www2.nature.nps.gov/stats/. Public Use Statistics Office, August 15, 2005

Figure 1 also illustrates that the average number of recreational visits per day has not exceeded the proposed carrying capacity from 2000 to 2004. Therefore, given the stable visitation pattern illustrated in Figure 1 and the fact that average recreational visitation has remained below the proposed carrying capacity in recent years, NPS believes that none of the action alternatives (B, C, D, and E) would impose significant impacts on visitors relative to baseline conditions (Alternative A) in the near future. NPS does not have sufficient information on future demand conditions to predict visitation trends over the expected 15 to 20-year life of the FGMPA/EIS.

The costs associated with impacts to the providers of commercial services were considered next. A detailed analysis of the economic impacts of recreational visitation in the Florida Keys area was conducted by a consortium of Federal, state, and local agencies and non-governmental organizations in 1996 (English et al. 1996). That study estimated that recreational visitation accounted for 61 percent of the total economic output, and 46 percent of the total employment, of Monroe County, Florida, in 1995/1996.[8] Applying the results of that study to 2004 visitation levels indicates that Dry Tortugas National Park accounts for approximately $43 million in total output and approximately 700 jobs in Monroe County. Therefore, the costs associated with any restrictions on commercial services are potentially significant.

[8] Total economic output is the value of all goods and services produced in an economy. Total employment is the number of full-time job equivalents supported by an economy.

Commercial services would continue to be available to transport visitors to the park and to provide guide/interpretive/educational services under each of the action alternatives. NPS believes that the total quantity of these commercial services would remain unchanged among the four action alternatives because the proposed carrying capacity would apply to all action alternatives. However, the composition of the commercial services offered would change to be consistent with the respective management zone allocation for each alternative (Table 2). Given the fact that average recreational visitation has remained below the proposed carrying capacity in recent years, NPS believes that none of the action alternatives (B, C, D, and E) would impose significant impacts on the total quantity of commercial services relative to baseline conditions (Alternative A) in the near future.[9] NPS does not have sufficient information to be able to estimate the impacts associated with changes in the composition of the commercial services offered among the different action alternatives, or to predict visitation trends over the expected 15 to 20-year life of the FGMPA/EIS.

Given this analysis, NPS believes there are no significant costs associated with visitors or providers of commercial services under any of the action alternatives.

4.0 Benefits

The incremental benefits that are potentially associated with each of the action alternatives include increased resource protection, improved visitor experiences, and increased "nonuse" values. Alternative B would afford minor additional resource protection over baseline conditions due to improved management of visitor use and monitoring of resource condition. Alternatives C and D would afford greater resource protection because they each would provide a minimal area for an effective Research Natural Area Zone, greater biodiversity, improved management of visitor use, and better research opportunities. Alternative E would afford the greatest degree of resource protection because it would provide the maximum area for a Research Natural Area Zone with commensurate levels of biodiversity, visitor use management, and research opportunities.

Alternative B would improve visitor experiences over baseline conditions by providing better visitor use management and some resource improvements. Alternative E would afford better visitor experiences by providing enhanced support services and a high degree of resource improvements. Alternatives C and D would improve visitor experiences the most by providing a wide range of visitor opportunities combined with a significant degree of resource improvements.

Nonuse values are the economic benefits that accrue to individuals who do not directly or currently use the resource and perhaps never intend to do so. Economists refer to these benefits using several different terms, including nonuse value, intrinsic value, existence value, and passive use value. The underlying motivations for nonuse values

[9] While NPS believes that the total quantity of commercial services provided would remain unchanged, the distribution of those services among the providers of commercial services would likely change.

include the satisfaction of knowing that a particular resource is protected and/or a desire to preserve the resource for future visitor use. Since the action alternatives would each improve resource protection over baseline conditions, they all would be expected to increase nonuse values. These increases would be least for Alternative B since it provides the least amount of resource protection. The other action alternatives would each provide greater increases in nonuse values; however, it is not possible to determine how much greater. While Alternative E provides the greatest degree of resource protection, it also provides a restricted range of future visitor uses. Alternatives C and D each provide a significant degree of resource protection and a wide range of future visitor uses.

NPS believes that Alternative C provides the greatest level of incremental benefits over baseline conditions. That is because Alternative C best achieves the objective of resource protection with the establishment of an effective Research Natural Area Zone, while continuing to provide a wide range of visitor uses. While Alternative E would establish the largest Research Natural Area Zone, it would also provide a more restricted range of visitor uses. Scientific evidence indicates that the size and configuration of the Research Natural Area Zone for Alternative C would reliably achieve the desired degree of biodiversity and habitat protection.

5.0 Conclusions

This analysis indicates no significant costs associated with impacts to visitors or providers of commercial services. However, significant benefits are identified for each action alternative. NPS believes that Alternative C, the proposed action, would provide the greatest level of benefits. Given no significant costs, Alternative C would also provide the greatest level of net benefits.

The benefits of this proposed regulatory action were not quantified due to a lack of available data, and because the additional cost of conducting a quantitative analysis was not considered to be reasonably related to the expected increase in the quantity and/or quality of relevant information. Nevertheless, based on the qualitative analysis conducted, NPS believes the benefits associated with this proposed regulatory action justify the associated costs. Further, this proposed regulatory action is not expected to have an annual economic effect of $100 million in cost, or to adversely affect an economic sector, productivity, jobs, the environment, or other units of government. This proposed regulatory action is expected to improve economic efficiency.

6.0 References

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